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## STUDIES ON THE ASSOCIATES AND PARASITES OF ZOOPLANKTON FROM SOUTHWEST AND SOUTHEAST COASTS OF INDIA

### ABSTRACT

Associates and parasites of zooplankton from southwest and southeast coasts of India were studied. Among the epizoic forms two species of ciliates infesting copepods were new records from Indian waters. Eight species of suctorians were found epizoic on copepods, ostracods and crab larvae. Two ectoparasitic flagellates were recorded from copepods, one from euphausiids and another from decapod larvae. One species of ciliate and a few trematod larvae were noticed in the body cavity of chaetognaths. Some cysts were also observed on copepods. Three suctorians were new species. The nature of association, host associate-parasite relationship and the rate of infestation are discussed. The intensity and percentage of infestation of the associates were more when the hosts occurred in abundance.

SEVERAL authors have studied epizoic and ectoparasitic protozoans from copepods (Santhakumari and Saraswathy 1970). However, very few studies are made on these forms from the Indian Ocean (Sewell, 1954; Santhakumari, 1985, 1986 a & b). The epizoites and ectoparasites are important as they injure the host. The copepod hosts are not only the major group both volumetrically and numerically among zooplankton, but also are economically important as they directly form food of pelagic fishes especially anchovies, sardines, and mackerels. Endoparasitic trematods and ciliates were found inside the body of chaetognaths which are exclusively carnivores and hence play important role in the food web of the sea. The euphausiids were infected with the flagellate parasite.

The zooplankton samples were collected with a Bongo net of 0.5 mm mesh width, 60 cm ring diameter and fitted with a calibrated flow meter. Collections were taken from

southwest and southeast coasts of India and samples were preserved in 4% formalin. Observations were made on living specimens on board also.

List of associates and parasites, hosts, nature of attachment and intensity of infection are given in Table - 1.

### EPIZOIC FORMS

*Trochiloides trivialis* Fenchel : this holotrichous ciliate was noticed from the ventral side of *Eucalanus* sp. from Cape Comorin region.

*Zoothamnium adamsi* Stokes : up to five colonies were noticed from a single host specimen. The largest colony carried a maximum of 14 individuals. Sewell (1951) described *Zoothamnium* sp. from *Euchaeta marina*.

*Ephelota gemmipara* Hertwing : was recorded from copepod in the Indian Ocean for the first time. Santhakumari (1985) observed

TABLE 1. Showing the host, associate/parasite and nature of attachment.

Associate/ Parasite	Host	Nature of attachment	Intensity of infection
<i>Trochiliodes trivialis</i>	<i>Eucalanus</i> sp.	Ventral side of the body.	30 specimens
<i>Zoothamnium adamsi</i>	<i>Eucalanus</i> sp.	Postero-dorsal side of cephalothorax, Urosomal segments.	Upto 5 colonies from a single host
<i>Ephelota gemmipara</i>	<i>Euchaeta marina</i> <i>Candacia tuberculata</i> <i>Labidocera acuta</i> <i>Undinula vulgaris</i> & from the zoea of crab	Postero-dorsal region of the cephalothorax. attached on thorax a spine and eye of zoea.	Maximum of 12 specimens
<i>Acineta euchaeta</i>	<i>Euchaeta marina</i> <i>E. wolfendeni</i> <i>Calanopia elliptica</i> <i>Labidocera acuta</i> <i>Eucalanus</i> spp.	Caudal cirri, Eurosomal segments egg sac, postero- dorsal side of ceyphalaothorax	Maximum of 30 specimens
<i>Acineta sagira</i>	<i>Euchaeta wolfendeni</i> <i>Labidocera acuta</i> <i>Euchaeta marina</i> <i>Calanopia elliptica</i>	Caudal cirri	Maximum of 30 specimens
<i>Paracineta pleuromamma</i>	<i>Euchaeta marina</i> <i>E. wolfendeni</i>	Anterior end of the body, region of the postero-dorsal cephalothorax.	Upto 4 specimens
<i>Paracineta gaetanai</i>	<i>Euchaeta wolfendeni</i> <i>E. marina</i> <i>Labidocera acuta</i>	Urosome caudal cirri.	Upto 8 specimens.
<i>Hallezia scottocalani</i>	<i>Rhincalanus</i> sp.	2nd antennae	One specimen
<i>Acineta satyanandani</i>	Ostracod- <i>Cypridina dentata</i>	Anterior portion of the host.	Upto 128 specimens
<i>Paracineta karunakarani</i>	<i>Cypridina dentata</i>	Antero-dorsal and lateral portions	Upto 96 specimens.
<i>Metaphrya sagittae</i>	<i>Sagitta enflata</i> <i>S. bedoti</i>	inside the Coelom	Maximum of 30 specimens
<i>Ellobiopsis chattoni</i>	<i>Undinula vulgaris</i> <i>Cosmocalanus darwinii</i> <i>Euchaeta marina</i> , Post larvae of <i>Penaeopsis</i> <i>rectacuta</i> and from the zoea of <i>Porcellana</i> sp.	mandible, maxillale, antenna & last swimming leg. Spine of the zoea	Upto 6 specimens
<i>E. elongata</i>	<i>Undinula vulgaris</i>	2nd antenna	One
<i>Amalocystis fagei</i> ( <i>T. fagei</i> )	<i>Pseudeuphausia latifrons</i>	mid dorsal region of the carapace	One
<i>Blastodinium chattoni</i>	<i>Undinula vulgaris</i> <i>Rhincalanus</i> sp.	Inside the body Inside the body	One One
<i>B. mangini</i>	<i>Labidocera</i> sp.	Inside the body	One
<i>B. oyirome</i>	<i>Eucalanus</i>	Inside the body	One
	<i>U. vulgaris</i>	Inside the body	One
Different types unidentified cysts.	<i>Euchaeta marina</i> <i>Undinula vulgaris</i> <i>Rhincalanus</i> sp.	Body proper	One

this species epizoic on crab larvae from Arabian Sea. Steuer (1932) recorded this species from *Pleuromamma borealis* and *P. gracilis* from Labrador stream.

*Acineta euchaeta* Sewell : was observed more frequently than other epizootes.

*Acineta sajirae* Santhakumari : several specimens of this species were observed from caudal cirri and the urosome of copepods.

*Acineta satyanandani* Santhakumari : was observed covering the host like patches of grass on ground. It was seen attached on the body proper and appendages of the marine Ostracod *Cypridina dentata* (Moller) collected from the shelf and slope areas of the south west coast and east coasts of India. 76% of infestation of *A. satyanandani* was noticed. This species showed a host specificity to *C. dentata*.

*Paracineta pleuromamma* Steuer : was a new record from Arabian Sea and also from the species *Euchaeta marina* and *E. wolfendeni*. Steuer (1932) described this species from *Pleuromamma xiphias*, *P. abnormalis*, *P. gracilis* and *P. borealis* from the area of Bengurla current.

*Paracineta gaetani* Sewell : was observed from the urosome of *E. wolfendeni*, *E. marina* and *Labidocera acuta*. Sewell (1951) described this species from the anterior appendages of *Gaetanus antarcticus* and on the posterior thoracic margin of *G. curvicornis*.

*Paracineta karunakarani* Santhakumari : was noticed epizoic on the ostracod *Cypridina dentata*. Majority of the ostracods were females with young ones in brood pouch. Very young specimens were devoid of any associates and from this it is clear that infestation takes place when they are in water and not from parents body. In very rare cases it was infested on the posterior side, wherein the body of the whole host was covered with this associates. This suctorian was commonly seen very near the mouth parts and the anterior end of cephalothorax.

The intensity as well as the percentage of infestation of this species was more (about 98%) when the host specimens occurred in abundance. This epizoot show host specificity to *C. dentata* and it coexists with *Acineta satyanandani*.

This species was very rarely observed epizoic on the second antenna of the female of *Rhincalanus* sp. Sewell (1951) described very small specimens even without stalk. Three different types of cysts were noticed on the cephalothorax of *Rhincalanus*, *Euchaeta marina* and *E. wolfendeni*.

*Acineta euchaeta* is the first among epizoots in having more number of copepod hosts and also occurred in dense population. The epizoic forms cause deterioration to the exoskeleton and serve as portals for harmful organisms like bacteria and fungi. The parasitic forms directly injure the hosts and lead to secondary infection also (Santhakumari and Gopalan, 1980).

#### Ectoparasites

*Ellobiopsis chattoni* Caullery : previously this ectoparasite had been known only from copepods. Santhakumari (1986 a) recorded this species from the first leg of the zoea of edible crab, and from the post larva of the shrimp from the Arabian Sea and Bay of Bengal. This parasite was observed from the copepods *Undinula vulgaris*, *Euchaeta marina* and *Cosmocalanus darwinii*. As a whole females were more infested than males by this parasite.

*Ellobiopsis elongata* Steuer : was noticed from the second antenna of *U. vulgaris* and is smaller than *E. chattoni*. The root of *E. chattoni* and *E. elongata* not only penetrate into the appendage of the host to serve as an organ of attachment but also as an organ of absorption and hence the harmful effects are much more than that of an epibiont.

*Amalocystis (Thalassomyces) fagaei* Boschma : was found on the mid dorsal region of the carapace of the euphausiid *Pseudeuphausia latifrons* and it was a new record to Bay of Bengal. The organ of fixation is much more advanced than *E. chattoni*. It is deeply rooted into the genital organ of the host and it directly takes nourishment through the sieve plates.

#### Endoparasites

*Metaphrya sagittae* Ikeda : This endoparasitic ciliate was found in the coelom of chaetognaths *Sagitta enflata* and *S. bedoti*.

Occurrence of endoparasitic dinoflagellate belonging to the genera *Blastodinium* parasitizing the coelomic cavity of their host, copepod was investigated. Parasitized individuals showed striking morphological changes in shape and colour, dark and chubby appearance. The percentage of infection of these parasites is very less.

The infestation of the ciliates in high intensity was observed in the culture tanks of shrimps and their food organism, tanaeidaceans (Santhakumari and Gopalan, 1980). A detailed study of the associates and parasites will be useful in the field of aquaculture.

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## MERCURY IN WATER, SEDIMENT AND IN SOME ESTUARINE ORGANISMS OF THE ENNORE ESTUARY, MADRAS, TAMIL NADU

#### ABSTRACT

Investigations were carried out to find out the level of mercury in water, sediment and in different tissues of the fish *Oreochromis mossambicus*, crab *Scylla serrata* and mussel *Perna viridis* of the Ennore estuary. The maximum mercury concentration was  $0.0763 \mu\text{g} \cdot \text{l}^{-1}$  in water and  $0.0428 \mu\text{g} \cdot \text{g}^{-1}$  in sediment and  $0.013 \mu\text{g} \cdot \text{g}^{-1}$  in the gill of *O. mossambicus*,  $0.014 \mu\text{g} \cdot \text{g}^{-1}$  in the brain of *S. serrata* and  $0.040 \mu\text{g} \cdot \text{g}^{-1}$  in the gill of *P. viridis*. The higher levels of mercury in the estuary may be due to the presence of some industries discharging effluents in the Ennore estuary.

DURING the last two decades, there is a great awareness of pollution due to toxic heavy metal like mercury and their adverse effects on human health through estuarine finfishes and